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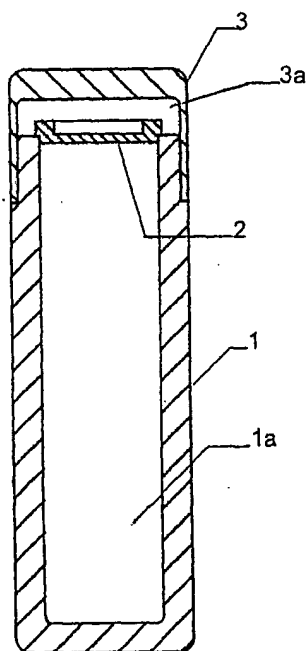
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(54) Title: DEVICE FOR DETECTING A TEMPERATURE VARIATION OF A PLACE OR PRODUCT



(57) Abstract: The present invention relates to a device for detecting a temperature variation of a place or product comprising a first receptacle (1) to receive and store a liquid including an open end (1b), a closure means (2) closing the open end (1b) of the first receptacle (1), a cover (3) overlapping said closure means (2) and the first receptacle (1), thereby forming a second receptacle (3a) to receive and to store a substance in the liquid, solid or granular form; wherein said closure means (2) is designed to move or rupture when submitted to the force exerted by the expansion of the liquid contained in the interior (1a) of the first receptacle (1) during its freezing process in such a way that creates a communication passage between the first (1) and second (3a) receptacles. The communication passage will interconnect the first (1) and second (3a) receptacles and, consequently, allow the liquid in the interior (1a) of the first receptacle (1) to get in contact with the substance contained in the second receptacle (3a). Thus, if the thawing of the liquid in the interior of the first receptacle (1) occurs, the liquid will mix to the substance in the second receptacle (3a) and will assume a new color different from its original color, thereby indicating the occurrence of a temperature variation.

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“DEVICE FOR DETECTING A TEMPERATURE VARIATION OF A PLACE OR
PRODUCT”

Technical Field

5 The present invention relates to a device for detecting a temperature variation in a place or product that allows the fast recognition of the occurrence of a variation in the temperature of said place or product, particularly when such temperature variation is sufficient to jeopardize the quality and integrity of a frozen or refrigerated product.

10 The subject matter of the present invention has special application in the sector of frozen and refrigerated products, as it can be used as a reliable mechanism to assist the ascertainment of the storage conditions of a frozen or refrigerated product until it arrives to the final consumer.

Background Art

15 The preservation of the quality of some products is directly associated with the temperature that they should be kept to prevent them from getting spoiled, damaged or inappropriate for consumption and/or use.

Food products, human organs and tissues, plasma, blood, drugs, medicines, vaccines and some electronic devices, for example, must be kept at low temperatures in order to preserve their quality characteristics.

20 However, sometimes these products are exposed to undesirable temperatures during its transportation and storage, causing damages to the product without however leaving them apparent. Thus, when coming across with these products, the manufacturers, transporters, traders and costumers do not have how to know that due to an undesired variation of temperature, such products could have suffered damages that jeopardize its quality, integrity and functioning.

It becomes necessary, therefore, to create a mechanism that alerts people for the occurrence of temperature variation in determined places and/or products, in order to prevent them from buying, consuming, putting on sale or using products that have become inappropriate for use and consumption.

30 In order to address this market demand, the applicant developed the product described in the Brazilian patent application nº PI 0600429-6 that discloses a device for detecting a temperature variation comprising a primary receptacle including a liquid, being said receptacle closed with a flexible closure and a cover containing a needle. A secondary receptacle is formed by the space between the cover and the
35 closure and is filled with a dyed powder. Upon freezing, the liquid expands and pushes the flexible closure against the needle causing the rupture of the seal and

the interconnection of the two receptacles. If the device is exposed to a thawing temperature, the liquid will melt, mix to the dyed powder and assume a new coloration that will alert people on the occurrence of a temperature variation.

However, this device presents some inconveniences, such as its complex construction. In order to work properly, the cover including the needle must be perfectly manufactured, since a short needle, a needle inclined in relation to the cover or a non-sharp needle tip can compromise the reliability of the product. In other words, if the needle tip is not sharp enough to rupture or tear the flexible closure or if the needle is in an inclined position in relation to the cover or is mistakenly manufactured in a short length, there will be no interconnection of the two receptacles when the liquid freezes and expands. This will avoid the good functioning of the device.

The European Patent N° EP 1084385 B1 describes an indicator for controlling storage temperature for refrigerated products, consisting of a transparent envelope comprising a constriction forming a sealed separation defining two sections each containing, at room temperature, a volume of aqueous solution differing in color, the device being so designed that when the aqueous solution is frozen, its expansion causes the separation between the two volumes to open, which, in solidified state, remain separate, but capable of mixing to present a new color when an increase in temperature causes them to melt.

Although the device described in the above mentioned European patent presents a simple construction, it is also fragile since the envelope into which the water solutions are stored can be torn, pierced or otherwise damaged during the user's handling, prejudicing the correct functioning of the device. Moreover, if the device is exposed to high temperatures before being frozen, it may occur the evaporation of the liquid in the interior of the envelope such that that the volume of the liquid contained in the interior of each section of the envelope reduces substantially. If such a thing occur, the expansion of this reduced volume of liquid will not be sufficient to rupture the separation between the two sections, restraining, the aqueous solutions from mixing together when thawed. Therefore, the device will not work properly.

In order to overcome the above cited inconveniences and disadvantages and to address the market demand for a device for detecting a temperature variation of a place or product more reliable and resistant, the applicant developed the present invention, which will be described from now on in details.

Objectives of the Invention

It is an objective of the present invention to provide a device for detecting a temperature variation of a place or product that allows immediate recognition of the occurrence of an undesired variation in the temperature of frozen or refrigerated places and/or products by a simple visual examination.

5 It is a further objective of the present invention to provide a device for detecting a temperature variation of a place or product that functions as a meter of the quality of products that need to be kept at determined temperature so that they can be consumed and securely used by consumers.

10 It is still an objective of the present invention to provide a device for detecting a temperature variation easily manufactured and having a low cost of production.

Summary of the invention

According to one aspect of the present invention, a device for detecting a temperature variation of a place or product comprising a first receptacle (1) to receive and store a liquid including an open end (1b), a closure means (2) closing
15 the open end (1b) of the first receptacle (1), a cover (3) overlapping said closure means (2) and the first receptacle (1), thereby forming a second receptacle (3a) to receive and to store a substance in a liquid, solid or granular form; wherein said closure means (2) is designed to move or rupture when submitted to the force exerted by the expansion of the liquid contained in the interior (1a) of the first
20 receptacle (1) during its freezing process in such a way that creates a communication passage between the first (1) and second (3a) receptacles. Thus, if a temperature variation occurs causing the thawing of the frozen liquid, it will mix with the substance contained in the interior of the second receptacle and will assume a color different from its initial color. This change in the color of the liquid
25 will alert users on the occurrence of the temperature variation on which the product has undergone, enabling them from refrain from consume those products, as they may have been damaged or deteriorated.

Optionally, the first receptacle comprises an inner wall provided with at least one cavity located next to the open end and the closure means comprises at least
30 one shoulder that fits into said one at least shoulder provided in the inner wall of the first receptacle. This will provide a more secure and reliable closure of the liquid within the first receptacle. Preferably, the first receptacle and/or the cover is transparent in order to facilitate the visualization of the initial color of the liquid and the color that it will assume in case a temperature variation occurs.

35 Alternatively, the first receptacle and the cover can be colored, including opaque and milky colors, and include transparent parts. The liquid contained in the

interior of the first receptacle is, preferably, water, alcohol or a mixture thereof. Other liquid material can be used provided that they are capable of freezing and thawing.

Preferably, the liquid contained in the interior of the first receptacle and the substance in the liquid, solid or granular form contained in the second receptacle
5 comprise a retarding agent. This retarding agent is preferably but not limited to alcohol. The retarding agent can be anyone of those already known in the state of the art provided that it can act to delay the freezing and thawing of liquids.

The substance in the liquid, solid or granular form contained in the interior of the second receptacle is preferably a colorant, and more preferential, a powder
10 colorant or a dyed liquid.

The device for detecting a temperature variation of a place or product may further comprise a fixing element for attaching it to a desired place or product.

Moreover, the device for detecting a variation temperature may further comprises an indication of the color that the liquid will assume if a temperature
15 variation occurs. This indication can be a label or a laser engraving located in the external surface of the first receptacle or the cover.

Although the device for detecting a temperature variation of the present invention can be used for innumerable temperatures, the freezing and thawing temperatures of the liquid contained in the interior of the first receptacle is preferably
20 in the range of -80°C to 0°C and -60°C to 0°C, respectively.

Brief Description of Drawings

Figure 1 is an exploded view of a first preferred embodiment of the invention, showing the first receptacle, the closure means and the cover;

Figure 2 is a cross sectional view of the device for detecting a temperature
25 variation shown on figure 1;

Figure 3 is a cross sectional view of the device for detecting a temperature variation shown on figure 1, illustrating the moment on which the liquid contained in the interior of the first receptacle is expanding;

Figure 4 is an enlarged view of detail A of figure 3, showing the expansion
30 phase of the liquid contained in the interior of the first receptacle of the device for detecting a temperature variation shown in figure 1;

Figure 5 is a cross sectional view of a second preferred embodiment of the present invention;

Figure 6 is an exploded view of the device for detecting a temperature
35 variation of figure 5, showing the first receptacle and the closure means;

Figure 7 is an exploded view of detail B of figure 5, showing the expansion phase of the liquid contained in the interior of the first receptacle of the device for detecting a temperature variation of figure 5.

Figure 8 is a perspective view of a third preferred embodiment of the present invention.

Detailed Description of the Invention

Figure 1 illustrates a first embodiment of the device for detecting a temperature variation of a place or product of the present invention, comprising a first receptacle 1 to receive and store a liquid including an open end 1b, a closure means 2 and a cover 3.

In this first embodiment of the invention, the first receptacle 1 presents a cylindrical form and is made of transparent or opaque plastic material in order to allow anyone to see the color of the liquid that will be introduced and stored in its interior 1a. However, it must be understood that for the purposes of the present invention, the first receptacle 1 can assume different forms and colors and can be manufactured in different materials, such as glass and any another suitable for storing and conditioning a liquid.

The closure means 2 is constituted of a piece made of rigid plastic having a diameter that perfectly fits into the diameter of the open end 1b of the first receptacle 1, thereby allowing a tight and secure fitting therein that prevents the liquid contained in the interior of the first receptacle 1 from flowing out therefrom.

Once again, for the purposes of the present invention, it must be understood that the closure means is not limited to the piece of plastic previously described, as the closure means can be a seal, a plate, a film or any other means capable of enclosing the liquid within the first receptacle 1.

Moreover, although the embodiment of the invention illustrated in figure 1 shows a closure means 2 fitted by pressure to the first receptacle 1, the invention foresees the possibility that the closure means is welded, glued or otherwise releasable attached to the first receptacle 1.

Figure 2 is a cross sectional view of the device for detecting a temperature variation of figure 1, illustrating the interior 1a of the first receptacle 1, the closure means 2 pressured fitted into the open end 1b of the first receptacle 1, the cover 3 and the second receptacle 3a formed by the overlapping of the cover 3 in the closure means 2 and the first receptacle 1. The second receptacle 3a is big enough for receiving and conditioning a substance in the liquid, solid or granular form.

The functioning of the device for detecting a temperature variation of a place or product is as follows: a liquid containing or not a retarding agent mixed therein is inserted in the interior 1a of the first receptacle 1, which is after closed by the closure means 2. A substance in the liquid, solid or granular form is inserted in the interior of the second receptacle 3a. The cover 3 is then attached to the first receptacle 1 thereby overlapping the closure means 2. The space of the second receptacle 3a is limited by the internal wall of the cover and the upper surface of the device of the closure means 2.

Once assembled, the device for detecting a temperature variation of a place or product is exposed or submitted to a determined temperature capable of making the liquid in the interior 1a of first receptacle 1 freezes. This freezing temperature can vary in accordance with the liquid that will be used and inserted in the first receptacle and in accordance with the amount of retarding agent that will be mixed to the liquid, if any. For example, the freezing temperature of the liquid in the interior of first receptacle 1 can be in the range of -80°C to 0°C.

When reaching the freezing temperature, the liquid will freeze and expand, increasing, therefore, its volume. With the expansion of the frozen liquid, the closure means 2 moves away from the open end 1b of first receptacle 1, thereby creating a communication passage between the two receptacles. The communication passage allows that, upon thawing, the liquid flows to the interior of the second receptacle and mixes with the substance contained therein, assuming a new coloration that will indicate the occurrence of the temperature variation.

When the device is exposed to low temperatures and the liquid contained in the interior 1a of first receptacle 1 is passing through the freezing process, the same will occur with the substance contained in the interior of the second receptacle 3a, if the substance is a liquid. In this case, both liquids will freeze. With the expansion of the liquid contained in the first receptacle 1a, it will occur the displacement or the rupture of the closure means 2, thereby creating the communication passage between the two receptacles. Therefore, when a temperature variation sufficient to thaw both liquids occur, they will flow from a receptacle to another which will result in a mixture of them, which will present a new color that will indicate the occurrence of a temperature variation.

It must be understood that, for the purposes of the present invention, the communication passage can be any opening that interconnects the first receptacle 1 to the second receptacle 3a enabling the liquid contained in the interior of the first receptacle to get in contact with the substance contained in the second receptacle

3a. The opening can be formed by the partial or total rupture of the closure means or by its displacement in a direction away from the open end 1b of first receptacle 1.

Figures 3 and 4 illustrate the moment when the liquid expands and dislocate the closure means 2 faraway from the open end 1b of the first receptacle 1, thus
5 creating, a communication passage between the receptacles.

If the substance contained in the interior of the second receptacle 3a is a liquid, the thawing temperature of the liquid in the first receptacle 1 will always have to be higher than the thawing temperature of the liquid in the interior of the second receptacle 3a. For example, the thawing temperature of the liquid in the interior of
10 the first receptacle 1 can be -10°C and of the liquid in the second receptacle 3a can be -12°C.

The determination of the freezing and thawing temperatures of the liquids in the two receptacles will be determined according to the liquids that will be used and to the amount of retarding agent that will be mixed to them, if any. The use of a
15 retarding agent mixed in the liquids enables the device of the present invention to be manufactured to monitor different temperatures, according to the convenience of those who will use it and to the temperature range that the product to be monitored should be kept so that it does not suffer any damage. This characteristic of the device for detecting a temperature variation of a place or product of the present
20 invention is extremely advantageous since it allows the device to be used to monitor different temperatures and different products and places.

On the other hand, if the substance inserted in the second receptacle 3a is solid or granular, such as a colorant in the form of a tablet or powder, it should have physical-chemical properties that prevent its petrification when the device is exposed
25 to freezing temperatures.

Thus, if the device for detecting a temperature variation is exposed or submitted to a thawing temperature that melts the frozen liquid, the thawed liquid will mix to the substance in the liquid, solid or granular form and will adopt a new coloration, evidencing the occurrence of the temperature variation. The liquid can,
30 for example, present a transparent coloration before mixing with the substance in the liquid, solid or granular form contained in the second receptacle 3a and adopt a yellow, red, black, or any other color after mixing to the substance.

The liquid contained in the interior of the first receptacle is preferably water, alcohol or a mixture thereof. The alcohol can be used as a retarding agent, that is,
35 can act to delay the freezing of the liquid and to delay its thawing. The use of

retarding agents, such as the alcohol can be important and sometimes necessary to reach the desired freezing and thawing temperatures.

In a preferred embodiment of the present invention, the liquid in the interior of the first receptacle 1 is composed for water with 15% of alcohol and the
5 substance contained in the interior of the second receptacle 3a is a colorant in the liquid form containing 12% of alcohol.

Figures 5, 6 and 7 illustrate a second preferred embodiment of the present invention, wherein the first receptacle 1' comprises an inner wall provided with at least one cavity 1c' located next to the open end 1b' and the closure means 2'
10 comprises at least one shoulder 2a' that fits into said at least one cavity 1c' provided in the inner wall 1b of the first receptacle 1'.

Upon fitting the shoulder 2a' in the cavity 1c', a more secure and tight closure of the liquid in the interior of the first receptacle is accomplished. Although all the examples of closure means described so far are rigid means, it should be
15 understood that for the purposes of the present invention flexible closure means can also be used provided that they have a minimum resistance that assures the sealing of the liquid in the interior of the first receptacle before it is frozen. The closure means can, for example, be a seal or a plastic or aluminum film that may include a frangible portion that ruptures upon submission of the force exerted by the
20 expansion of the liquid, thereby creating a communication passage between the two receptacles.

With the device for detecting a temperature variation of a place or product of the present invention, any person can easily verify if a product was exposed and/or submitted to a temperature that can jeopardize or damage its quality. Therefore, the
25 present invention allows that people in general refrain to use or consume potentially deteriorated and inappropriate products.

The use of the device for detecting a temperature variation of a place or product of the present invention is extremely advantageous to traders and costumers in general. When evidencing that the coloration of the liquid contained in
30 first receptacle has undergone to any alteration, traders will refrain from putting on sale those products whose quality is presumed harmed. Besides, when verifying the change of color in the liquid contained in the device, costumers will not buy those products presumed damaged.

The device of the present invention can be used in the storage,
35 transportation and sale exposition of frozen and refrigerated products, such as meat, dairy products, etc., as well as in the transportation of blood, plasma, human organs

and tissues, vaccines, drugs and any other product that need to be kept at low temperatures.

The device of the present invention can further comprises a fixing element to attach the device for detecting a temperature variation in a desired place, such as in
5 the packing of a product, boxes for storing products, containers, rooms and etc.

Usually, the desirable storage temperatures of frozen and refrigerated products are 0°C, -6°C, -12°C and -18°C. However, the device can be manufactured to control different temperatures, which are not limited to those mentioned above. For example, the freezing and thawing temperatures of the liquid contained in the
10 interior of the first receptacle and of the substance in the interior of the second receptacle when in the liquid form are in the range of -80°C to 0°C and -60°C to 0°C, respectively.

The invention can further comprise an indication of the color that the liquid will assume when a temperature variation occurs. This indication can be a label or a
15 laser engraving made in the external surfaces of the cover or the first receptacle. These features are illustrated in figure 8 that shows a third embodiment of the invention, wherein the first receptacle 1' has a transparent window 4 that enables the visualization of the color of the liquid contained therein and a label 5 showing which color the liquid will assume if a temperature variation occurs.

20 While certain embodiments of the invention have been illustrated for the purposes of this disclosure, numerous changes in the device of the invention presented herein may be made by those skilled in the art such changes being embodied within the scope and spirit of the present invention as defined in the following claims.

CLAIMS

1. A device for detecting a temperature variation of a place or product comprising:

5 a first receptacle (1) to receive and store a liquid including an open end (1b);
 a closure means (2) closing the open end (1b) of the first receptacle (1);
 a cover (3) overlapping said closure means (2) and the first receptacle (1),
thereby forming a second receptacle (3a) to receive and to store a substance in the
liquid, solid or granular form; wherein

10 said closure means (2) is designed to move or rupture when submitted to the
force exerted by the expansion of the liquid contained in the interior (1a) of the first
receptacle (1) during its freezing process in such a way that creates a
communication passage between the first (1) and second (3a) receptacles.

2. A device for detecting a temperature variation of a place or product
15 according to claim 1, wherein upon thawing, the liquid contained in the interior (1a)
of the first receptacle (1) mixes to the substance contained in the interior of the
second receptacle (3a) and assumes a color different from its initial color.

3. A device for detecting a temperature variation of a place or product
according to claim 1 or 2, wherein said first receptacle includes an internal wall
20 provided with at least one cavity (1c') located next to the open end (1b') and said
closure means (2') comprises at least one shoulder (2a') that fits into said at least
one cavity (1c') provided in said internal wall of the first receptacle (1').

4. A device for detecting a temperature variation of a place or product
according to any of claims 1 to 3, wherein at least one of the first receptacle (1, 1')
25 and the cover (3) is transparent.

5. A device for detecting a temperature variation of a place or product
according to any of claims 1 to 4, wherein the liquid contained in the interior (1a) of
the first receptacle (1) is water, alcohol or a mixture thereof.

6. A device for detecting a temperature variation of a place or product
30 according to any of claims 1 to 5, wherein at least one of the liquid contained in the
interior (1a) of the first receptacle (1) and the substance in the liquid, solid or
granular form contained in the second receptacle (3a) comprises a retarding agent.

7. A device for detecting a temperature variation of a place or product
according to any of claims 1 to 6, wherein the substance in the liquid, solid or
35 granular form contained in the interior of the second receptacle (3a) is a colorant.

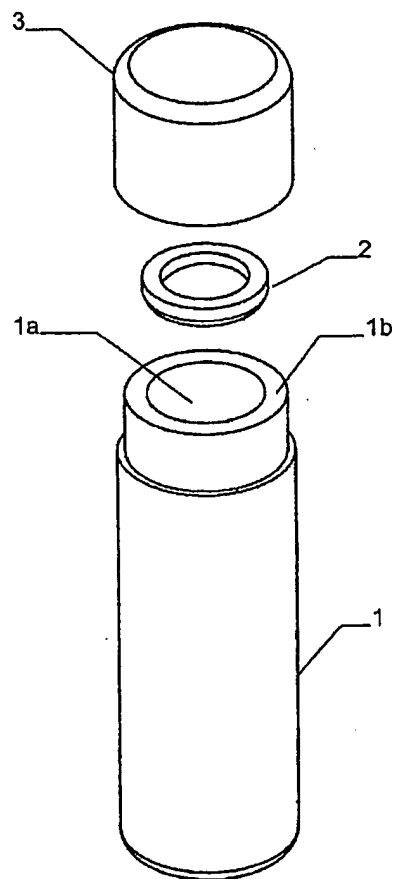
8. A device for detecting a temperature variation of a place or product according to any of claims 1 to 7, further comprising a fixing element to attach the device for detecting a temperature variation to a desired place.

5 9. A device for detecting a temperature variation of a place or product according to any of claims 1 to 8, wherein the freezing and thawing temperatures of the liquid contained in the interior of the first receptacle (1) are in the range of -80°C to 0°C and -60°C to 0°C, respectively.

10 10. A device for detecting a temperature variation of a place or product according to any of claims 1 to 9, further comprising an indication (5) of the color that the liquid will assume if a temperature variation occurs.

1 / 4

Fig. 1



2 / 4

Fig. 2

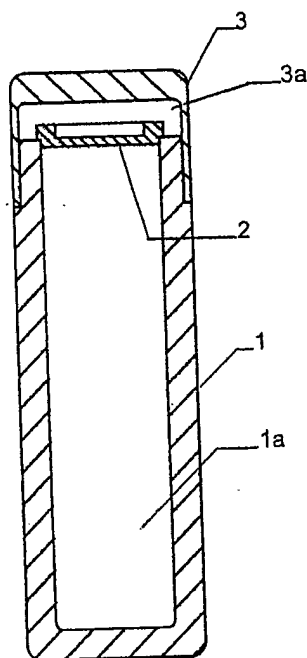


Fig. 3

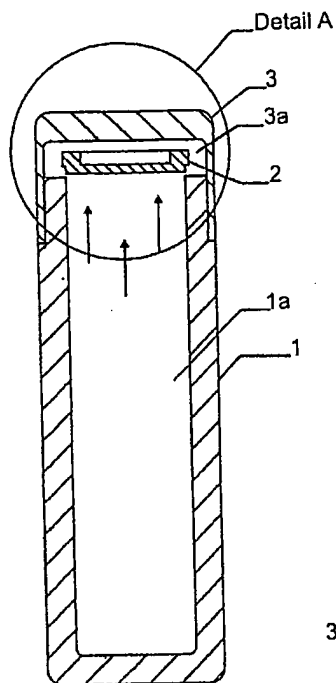


Fig. 4

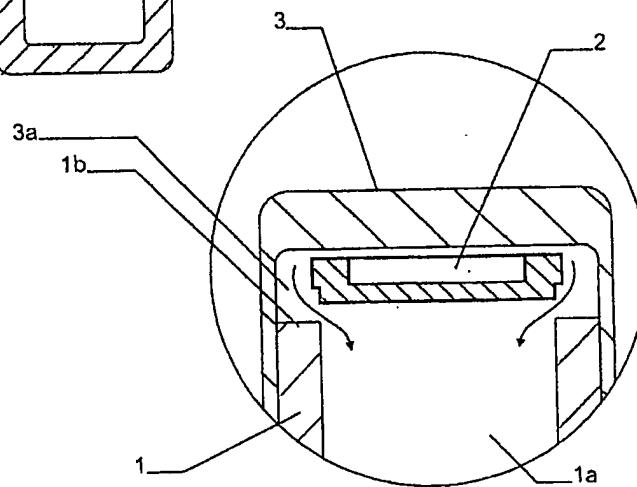


Fig. 5

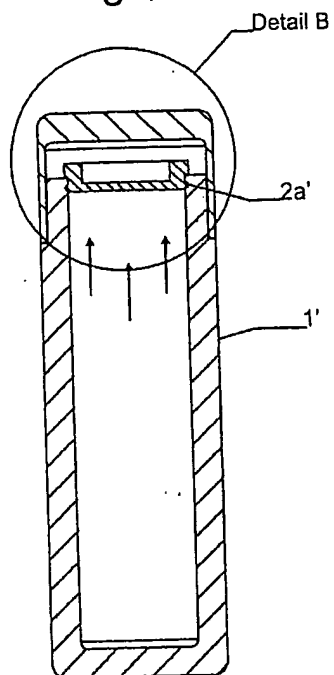


Fig. 6

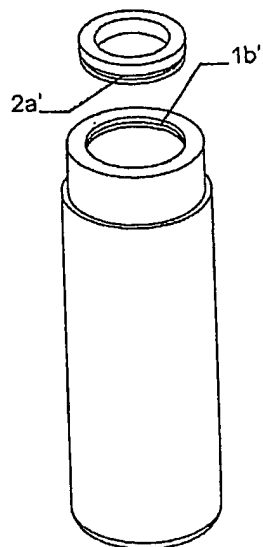


Fig. 7

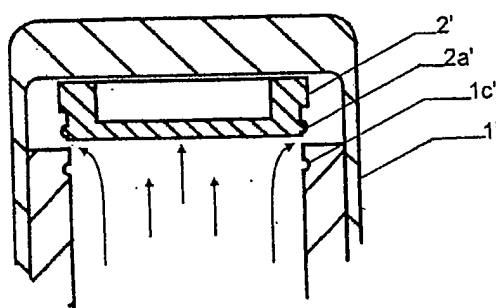
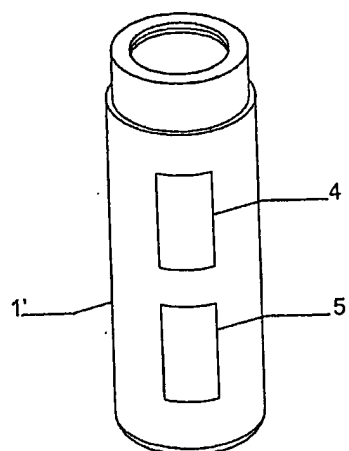


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER
 INV. G01K11/06 G01K3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 G01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| X | GB 2 051 361 A (SALA F) 14 January 1981 (1981-01-14) abstract page 1, line 60 - line 98 page 3, line 4 - line 46 | 1-10 |
| X | FR 2 678 373 A1 (COOL SARL [FR]) 31 December 1992 (1992-12-31) abstract page 2, line 8 - page 3, line 9 | 1-10 |
| X | EP 0 501 880 A (COOL SARL [FR]) 2 September 1992 (1992-09-02) abstract; figure 5 | 1-10 |
| | ----- -/-- | |



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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 3 702 077 A (SZABO BELA G) 7 November 1972 (1972-11-07) abstract column 2, line 58 - column 3, line 28 ----- | 1-10 |
| A | GB 1 604 648 A (KIRKHAM G A) 9 December 1981 (1981-12-09) page 1, line 9 - line 13 page 1, line 37 - line 55 ----- | 1-10 |

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/BR2007/000111

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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| FR 2678373 | A1 | 31-12-1992 | NONE | |
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Form PCT/ISA/210 (patent family annex) (April 2005)

DERWENT-ACC-NO: **2008-A17691**

DERWENT-WEEK: 200801

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TITLE: Temperature variation detection device for e.g. meat box
has water receptacle overlapped by a cover along with the
seal to form a colorant receptacle that is contacted by
water receptacle via a passage created during **freezing**

INVENTOR: UTPADEL, R

PATENT-ASSIGNEE: UTPADEL R[UTPAI]

PRIORITY-DATA: 2006BR-0000896 (May 9, 2006)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|------------------|-------------------|----------|-------|-------------|
| WO 2007128093 A1 | November 15, 2007 | E | 019 | G01K 011/00 |

DESIGNATED-STATES: AE AG AL AM AT AU AZ BA BB BG BH BR BW BY BZ CA CH CN
CO CR
CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM GT HN HR HU ID IL IN IS JP KE
KG KM KN KP KR KZ LA LC LK LR LS LT LU LY MA MD MG MK MN MW MX MY MZ NA
NG NI
NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SK SL SM SV SY TJ TM TN TR TT TZ UA
UG US UZ VC VN ZA ZM ZW AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM
GR
HU IE IS IT KE LS LT LU LV MC MT MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR
TZ UG ZM ZW

APPLICATION-DATA:

| PUB-NO | APPL-DESCRIPTOR | APPL-NO | APPL-DATE |
|----------------|-----------------|----------------|-------------|
| WO2007128093A1 | N/A | 2007WO-BR00111 | May 9, 2007 |

INT-CL (IPC): G01K003/00, G01K011/00, **G01K011/06**

ABSTRACTED-PUB-NO: WO2007128093A

BASIC-ABSTRACT:

NOVELTY - A temperature variation detection device has two receptacles. An open end of the first receptacle (1) receives water or alcohol. A cover (3) overlaps the seal (2) and the first receptacle to form a second receptacle (3a). The second receptacle receives and stores a colorant or a retarding

agent. An expansion of e.g. water in the interior (1a) of the first receptacle during **freezing** ruptures the seal. A communication passage is created between the receptacles. The water gets in contact with the colorant. It assumes a new color, indicating the occurrence of temperature variation.

USE - For detecting a temperature variation during storage, transportation and sale exposition of **frozen** or refrigerated product such as meat, a dairy product, human blood, plasma, an organ, a tissue, a vaccine, or a drug. The device is also used for detecting a temperature variation in a packing of a product, a box for storing products, a container, or a room.

ADVANTAGE - The device allows immediate and reliable recognition of an undesired temperature variation in **frozen** or refrigerated places and/or products. A simple visual examination is performed. The device functions as a meter of the quality of products that need to be kept at determined temperature. As a result, the products are securely consumed. The device is easily manufactured leading to low production cost.

DESCRIPTION OF DRAWING(S) - The drawing shows a cross-sectional view of the temperature variation detection.

First receptacle 1

Interior 1a

Seal 2

Cover 3

Second receptacle 3a

CHOSEN-DRAWING: Dwg.2/8

TITLE-TERMS: TEMPERATURE VARIATION DETECT DEVICE MEAT BOX WATER RECEPTACLE

OVERLAP COVER SEAL FORM COLOUR RECEPTACLE CONTACT WATER RECEPTACLE

PASSAGE **FREEZE**

DERWENT-CLASS: B04 S03 W04

CPI-CODES: B11-C08; B12-K04E;

EPI-CODES: S03-B01X; W04-F01D; W04-P01D3;

CHEMICAL-CODES:

Chemical Indexing M6 *01*

Fragmentation Code

M905 R501 R515

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C2008-004649

Non-CPI Secondary Accession Numbers: N2008-014016